



Serial No.: 09/863,651

## REMARKS

In the Office Action mailed June 6, 2002:

Claim 9 was objected to because of the following informality: In Line 1 a typographical error of "bone wire".

Claim 1-4, 6, 10 and 12-14 were rejected under 35 U.S.C. 102(b) as being anticipated by Moyle et al. (U.S. 3,706,840).

Claims 5, 7-9, 11 and 15-17 were rejected under 35 U.S.C. 103(a) as being unpatentable over Moyle as applied to claim 1, 10 and 13.

Applicant's invention relates to an integrated circuit package and method of assembling it that uses a lead finger mounting ring both to mount the lead fingers and to dam the flow of a liquid epoxy material that is used to encase bond wires that connect the lead fingers to bond pads on a semiconductor chip. Advantageously, the lead fingers are mounted on the mounting ring (Fig. 1B; step 320 of Fig. 3); bond wires are attached to bond pads and package leads (Fig. 1C; step 330 of Fig. 3); and an epoxy material is dispensed into the space defined by the mounting ring to encase the bond wires (Fig. 1D; step 340 of Fig. 3). As a result, the mounting ring prevents run-off of the epoxy material.

While the Moyle reference is also directed to an integrated circuit package that uses an epoxy 46 to encase the bond wires, the structure of the Moyle device is different from applicant's. The leads 21 are mounted on a glass plate 31 and held in place by fusing a glass ring 32 to the periphery of the glass plate (Fig. 4B; Col. 5, lines 34-35). The glass ring on top of the leads, which is identified as element 43 in Figs. 4C and 4D, is then used to confine a liquid epoxy 46 that is applied to encase the bonding wires.

To emphasize this difference between applicant's invention and Moyle, the independent claims have been amended to specify that the package lead or leads is/are attached to an upper surface of the lead finger mounting ring.

Applicant's structure is simpler than Moyle's and easier to assemble and is therefore less prone to failure. In applicant's structure, the lead fingers need only be aligned with the mounting ring to form a structure that can then be connected by bond wires to the pads on the semiconductor die. In contrast, in Moyle the lead fingers must be aligned with the edges of

the glass plate 31, the glass ring 32 must be aligned with the lead fingers and the ring and plate must be fused together by the application of suitable heat and pressure.

Because Moyle does not disclose or suggest an arrangement in which the package leads are attached to an upper surface of the lead finger mounting ring as is now recited in each of the independent claims, independent claims 1, 6, 10 and 13 are patentable over Moyle.


Dependent claims 2-5, 7-9, 11-12, and 14-17 are patentable for the same reasons claims 1, 6, 10 and 13 are patentable.

In view of the foregoing, applicant believes that all of the claims are now in condition for allowance and respectfully requests the Examiner to pass the subject application to issue. If for any reason the Examiner believes any of the claims are not in condition for allowance, he is encouraged to phone the undersigned at (650) 849-7777 so that any remaining issues may be resolved.

Aside from the fee for an extension of time, no additional fee is believed due for filing this response. However, if a fee is due, please charge such fee to Pennie & Edmonds LLP's Deposit Account No. 16-1150.

Respectfully submitted,

Date December 5, 2002

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## APPENDIX A

### Changes to the Claims

The rewritten claims were revised as follows:

1. (Amended) An integrated circuit package, comprising:
  - a substrate having a center region and a peripheral region;
  - a semiconductor die positioned on the center region of the substrate, the semiconductor die having a bond pad;
  - a lead finger mounting ring positioned on the peripheral region of the substrate;
  - a package lead attached to an upper surface of the lead finger mounting ring;
  - a bond wire with a first end portion coupled to the package lead and a second end portion coupled to the bond pad;
  - an epoxy material confined by the lead finger mounting ring and forming a first encapsulation over the bond wire, the semiconductor die, and a portion of the package lead;
  - and
  - a mold compound forming a second encapsulation over the first encapsulation, the lead finger mounting ring, the substrate, and a portion of the package lead.
6. (Amended) An integrated circuit package, comprising:
  - a substrate having a center region and a peripheral region;
  - a die attachment pad disposed on the center region of the substrate;
  - a semiconductor die positioned on the die attachment pad, the semiconductor die comprising a plurality of bond pads;
  - a non-conductive lead finger mounting ring positioned on the peripheral region of the substrate;
  - a plurality of package leads attached to an upper surface of the lead finger mounting ring;

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a plurality of bond wires with first end portions coupled to the package leads and second end portions coupled to the bond pads;

an epoxy material confined by the lead finger mounting ring and forming a first encapsulation over the bond wires, the first encapsulation having a rounded top surface; and

a mold compound forming a second encapsulation over the first encapsulation, the lead finger mounting ring, and the substrate, wherein the first encapsulation limits movement of the bond wires during formation of the second encapsulation.

9. (Amended) The package of claim 8, wherein a wire diameter of the at least one [bone] bond wire is under 25  $\mu\text{m}$ .
10. (Amended) A process for forming an integrated circuit package, comprising:
  - providing a substrate having a center region and a peripheral region;
  - attaching a lead finger mounting ring on the peripheral region of the substrate;
  - mounting package leads on an upper surface of the lead finger mounting ring;
  - positioning a semiconductor die on the center region of the substrate;
  - attaching bond wires to the package leads and to the semiconductor die;
  - limiting movement of the bond wires with an epoxy material;
  - after limiting movement of the bond wires, enclosing the substrate, the semiconductor die, the lead finger mounting ring, the bond wires, and the epoxy material in a mold compound.
13. (Amended) A process for forming an integrated circuit package, comprising:
  - providing a substrate having a center region and a peripheral region;
  - attaching a lead finger mounting ring on the peripheral region of the substrate;
  - mounting package leads on an upper surface of the lead finger mounting ring;
  - positioning a semiconductor die on the center region of the substrate, the semiconductor die comprising a plurality of bond pads;
  - attaching bond wires to connect the package leads and the bond pads;

dispensing epoxy material over the bond wires, the epoxy material being confined by the lead finger mounting material;

curing the epoxy material to form a protective encapsulation for the bond wires; and  
after curing the epoxy material, dispensing a mold compound over the substrate, the semiconductor die, the lead finger mounting ring, the bond wires, and the epoxy material to form the integrated circuit package.

17. (Amended) The package of claim 16, wherein a wire diameter of the at least one [bone] bond wire is under 25  $\mu\text{m}$ .